

In the Claims:

Please cancel claims 5, 6, 8, 11, 12, 13, 15, 16 and 18.

Please amend claims 1, 2, and 3 as follows.

1. (Currently Amended) In a magnetic read head having an air bearing surface (ABS), a magnetic tunnel junction (MTJ) sensor for connection to sense circuitry for detecting changes in electrical resistance within the sensor, the sensor comprising:

a MTJ stack with an active region disposed at the ABS and having two opposite sides each disposed generally orthogonally to the ABS, the MTJ stack comprising:

an a first antiferromagnetic (AFM) layer spanning the active region,
a pinned layer of ferromagnetic (FM) material in contact with the AFM layer,

a free layer of FM material spanning the active region and extending beyond each of the two opposite sides thereof, and

a tunnel junction layer of electrically nonconductive material disposed between the pinned layer and the free layer in the active region;
and

~~a longitudinal bias layer~~ a second antiferromagnetic layer formed from an insulating antiferromagnetic material formed on and in contact with the free layer outside of the active region for biasing the magnetic moment of the free layer in substantially a predetermined direction in the absence of an external magnetic field.

2. (Currently Amended) The sensor of claim 1 ~~further comprising:~~

~~an insulating layer of electrically nonconductive material formed on and in contact with the free layer outside of the active region and in abutting contact~~

~~with the two opposite sides of the active region.~~ wherein said second antiferromagnetic layer is comprised of nickel oxide.

3. (Currently Amended) The sensor of claim 2 wherein ~~the longitudinal bias layer~~ said second antiferromagnetic layer is disposed without contacting the active region.

Claims 4. – 46. (Cancelled)